© Published 2013. This article is a U.S. Government work and is in the public domain in the USA
DOI: 10.1111/1475-6773.12065
METHODS ARTICLE

Estimating Inpatient Hospital Prices from State Administrative Data and Hospital Financial Reports

Katharine R. Levit, Bernard Friedman, and Herbert S. Wong

Objective. To develop a tool for estimating hospital-specific inpatient prices for major payers.

Data Sources. AHRQ Healthcare Cost and Utilization Project State Inpatient Databases and complete hospital financial reporting of revenues mandated in 10 states for 2006.

Study Design. Hospital discharge records and hospital financial information were merged to estimate revenue per stay by payer. Estimated prices were validated against other data sources.

Principal Findings. Hospital prices can be reasonably estimated for 10 geographically diverse states. All-payer price-to-charge ratios, an intermediate step in estimating prices, compare favorably to cost-to-charge ratios. Estimated prices also compare well with Medicare, MarketScan private insurance, and the Medical Expenditure Panel Survey prices for major payers, given limitations of each dataset.

Conclusions. Public reporting of prices is a consumer resource in making decisions about health care treatment; for self-pay patients, they can provide leverage in negotiating discounts off of charges. Researchers can also use prices to increase understanding of the level and causes of price differentials among geographic areas. Prices by payer expand investigational tools available to study the interaction of inpatient hospital price setting among public and private payers—an important asset as the payer mix changes with the implementation of the Affordable Care Act.

Key Words. Inpatient hospital prices, revenue, Medicare, Medicaid, private insurance

One of the most expensive groups of health care services is inpatient hospitalizations, which along with outpatient treatment accounts for 37 percent of all health care treatment purchased in the United States in 2012.¹ Little is publicly revealed about the actual revenue, which we refer to as the paid “price,” that hospitals receive for an inpatient stay and particularly how the

prices vary among payers. This lack of information limits the consumer's ability to compare prices with quality of care for the treatment of specific conditions in specific hospitals. For those who pay for treatment themselves, not knowing what insurers pay for a particular hospitalization does not allow consumers to effectively negotiate the price they should pay. Lack of price information also limits researchers' ability to investigate the way hospitals set prices for specific conditions, how prices vary among payers, the implications of payer mix on private payers, and the effect of competition within market areas. Public information on prices could afford consumers and analysts better access to information with which to evaluate the value of inpatient hospital treatment, and to better understand the revenue streams for hospitals within market areas. Such public information could also help to educate patients on cost considerations in choosing hospitals (Sommers et al. 2013) and help promote acceptance among consumers of new benefit designs, including centers of excellence and reference pricing, that integrate quality of care and cost in medical decisions made by consumers (Robinson and MacPherson 2012).

To address the information gap, we investigated the feasibility of estimating payer-specific prices received by specific hospitals for each hospital stay. Publicly accessible data on financial transactions for specific types of inpatient stays are usually limited to prices paid by specific government payers such as Medicare or to charges billed to the patient or his insurer.² Charges have only limited use in understanding prices received by hospitals because the billed charges are subject to substantial discounts negotiated by private insurers, payment rates imposed by Medicare and Medicaid, and nonpayment by some uninsured patients, producing paid prices that often differ by payer for the same service.

The objectives of this study are to present the methods used to estimate hospital prices by payer in 10 states and evaluate the results against other data sources. We will present sample hospital prices by state for all diagnoses adjusted for case mix and differences in underlying wage rates. The study will conclude with a discussion of how estimated prices could be of value to consumers and researchers.

Address correspondence to Katharine R. Levit, B.A., Truven Health Analytics, 7700 Old Georgetown Road, Suite 650, Bethesda, MD 20814; e-mail: Katharine.levit@truvenhealth.com. Bernard Friedmann, Ph.D., and Herbert S. Wong, Ph.D., are with the Agency for Healthcare Research and Quality, Rockville, MD.

METHODS

Data

The data were derived from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) and hospital financial reporting from 10 states for 2006.

Healthcare Cost and Utilization Project. Healthcare Cost and Utilization Project is sponsored by the Agency for Healthcare Research and Quality (AHRQ).³ HCUP databases integrate the data collected by state governments, hospital associations, and private data organizations to create a national health care information resource of hospital, ambulatory surgery center, and emergency department discharge data. For this project, we used the SID, which include information on patient demographics, diagnoses, procedures, charges, payers, and hospital characteristics; price information is not available.

Hospital Financial Data. Some states collect detailed financial data on inpatient and outpatient charges and net revenue by major payer for each hospital in their state. We identified geographically diverse states whose data contained (1) hospital-specific financial information for each major payer (Medicare, Medicaid, private insurance and other payers, and self-pay); (2) charges and net revenue separately for inpatient and outpatient services for each payer; and (3) financial information for most hospitals in the state. We also looked for states that would grant permission to link the financial data to the HCUP-SID and to release the state's identity.

Our search narrowed to 10 states (California, Florida, Massachusetts, Nevada, New Jersey, Virginia, West Virginia, Wisconsin, and two additional states where permission to identify them was not obtained) that provided the most complete hospital financial information for our purposes for 2006.

Estimating Hospital Prices

To estimate inpatient hospital prices, we created payer-specific price-to-charge ratios (PCRs) for each hospital by major payer using the hospital-specific financial data in each state. Payer-specific PCRs were then applied to the HCUP-SID charges to estimate the price of a single hospital stay based on

the primary payer and gross charges for that discharge. We estimated PCRs and prices for four major payers: Medicare, Medicaid, self-pay, and private and other insurance, a category of payers that includes private insurance, CHAMPUS, workers' compensation, and county indigent programs, among others. Most states reported managed care payments made for Medicare, Medicaid, and private insurance separately or combined, respectively, with Medicare, Medicaid, and private insurance fee-for-service data. This aligns with the treatment of managed care payers in HCUP databases.

Data Validation and Hospital Mapping. We obtained state financial data and checked for internal consistency. We excluded noncommunity hospitals (rehabilitation, psychiatric, federal, and long-term care), California hospitals operating under capitated arrangements that did not report sufficient state financial data, and a few hospitals that could not be matched between the two datasets.

We compared total number of stays and charges in the linked HCUP-SID and state financial data, where we found almost no exact matches. Discrepancies were related to differences in definition between admissions and discharges,⁴ in the period covered by the report (fiscal years, rather than calendar years)⁵ or in reporting instructions that either excluded or allowed the reporting of long-term care units (such as nursing home units). Reporting period differences were not expected to pose any significant problem; we did not expect great differences in the PCRs when the timing was offset by several months. The inclusion of nursing home units presented a potential bias to the extent that a payer may have discounted charges for acute care differently from long-term care, but the actual effect was unknown and we could not adjust for this.

Estimating PCRs. We defined the "price" of a hospital stay as equal to the revenue received by a hospital from all sources. The sum of "prices" for all inpatient discharges in a particular hospital equals the total net inpatient revenue received by the hospital. In most states, we calculated net revenue by taking gross inpatient charges (including Medicaid disproportionate share hospitals [DSH] payments) reduced for inpatient contractual adjustments and other uncollected inpatient revenue, including bad debt, charity care, and other deductions such as employee, courtesy, administrative, and prompt payment discounts. We increased for other revenue sources associated with inpatient stays, including capitation payments and government grants and tax

appropriations (subsidies for indigent inpatient care). Table 1 presents the summarized values across the 10 states for items included in the calculation of the PCRs.

Data required to construct net inpatient revenues were not always available for each payer. The most important data elements were gross inpatient revenues and contractual adjustments; contractual adjustments alone accounted for 95–99 percent of all deductions from insurers' gross revenue. All states reported gross inpatient revenue for each major payer with the exception of California and West Virginia. (California reported combined self-pay and miscellaneous other payers, and West Virginia reported combined self-pay and private insurance other than the state employee plan.) Most states also reported inpatient contractual adjustments by payer for each hospital. Exceptions included states reporting combined inpatient and outpatient values for each payer (California and Virginia) and Massachusetts that reported combined inpatient contractual adjustments for private insurance and other insurance, and self-pay. States often reported inpatient and outpatient values combined for deductions from revenue such as bad debt, discounts, and charity care, and sometimes reported one value for all payers.

We developed techniques to estimate unreported values needed to calculate net revenue. For example, we estimated contractual adjustments for California when only combined inpatient and outpatient contractual adjustments were available. We summarized inpatient and combined inpatient and outpatient gross revenues and contractual adjustments in states that reported this detail. We calculated the inpatient share of gross revenues and of contractual adjustments. We divided the inpatient share of contractual adjustments by the inpatient share of gross revenues to create a "bias" adjustment that measures the average difference in the two inpatient shares. Next, we multiplied the bias adjustment by the inpatient share of gross revenues in each California hospital and multiplied the result by the reported inpatient-outpatient contractual adjustment value to estimate inpatient contractual adjustments. Most estimating techniques relied on relationships reported for the same data elements in other states or on payer distributions within the hospital for items such as gross revenues.

Also, we assumed that deductions from revenue for bad debt, charity care, and discounts were applicable to all payers, based on information from states that reported payer-specific values. Estimation of deductions from revenue amounted to only 1–5 percent of all deductions from revenue on average for Medicare, Medicaid, and private and other insurance payers; any estimating bias introduced should have very little effect on PCRs for

Table 1: Summary of State Financial Data for Ten States Used to Calculate Price-to-Charge Ratios

<i>Revenue Category</i>	<i>Payer</i>				
	<i>All Payers</i>	<i>Medicare</i>	<i>Medicaid</i>	<i>Private and Other Insurance*</i>	<i>Self-Pay</i>
<i>Inpatient revenue in millions</i>					
Gross revenue [†]	320,979	139,557	53,984	106,408	20,984
Deductions from gross revenues	236,576	114,591	40,003	67,544	14,412
Contractual adjustments	217,710	112,955	39,084	63,894	1,751
Bad debt	5,287	453	128	699	4,007
Charity	8,559	207	27	113	8,213
Discounts	4,549	900	527	2,698	424
Medical denials	256	77	22	140	17
Disproportionate share funds transferred to related entity [‡]	215	—	215	—	—
Additions to revenue	2,418	802	412	541	663
Grants/tax appropriations	753	—	90	—	663
Capitation revenue	1,664	802	321	541	—
Net revenue [§]	86,868	25,815	14,396	39,406	7,233
Addendum: Price-to- charge ratio (PCR)	0.2467	0.1530	0.2514	0.3037	0.5781
<i>Distribution of deductions from gross revenue</i>					
Deductions from gross revenues	100%	100%	100%	100%	100%
Contractual adjustments	92%	99%	98%	95%	12%
Bad debt	2%	0%	0%	1%	28%
Charity	4%	0%	0%	0%	57%

Continued

Table 1. *Continued*

Revenue Category	Payer				
	All Payers	Medicare	Medicaid	Private and Other Insurance*	Self-Pay
Discounts	2%	1%	1%	4%	3%
Disproportionate share funds transferred to related entity	100%	—	100%	—	—

Note. Ten states include California, Florida, Massachusetts, Nevada, New Jersey, Virginia, West Virginia, Wisconsin, and two additional states where permission to identify them was not obtained.

*Other payers other than the county indigent program is reported in combination with self-pay in California.

†Includes adjustments by payer to assign some gross charges to secondary payers based on information from the Medical Expenditure Panel Survey. This will better align gross charges by primary payer with deductions from revenue. Includes Medicaid Disproportionate Share Hospital (DSH) payments in California.

‡Medicaid DSH funds returned to state entity in California.

§A small amount of prior year allowances and adjustments are not shown for New Jersey; however, prior year allowances and adjustments are included in net revenue.

major insurers. However, estimating bias did have an effect of self-pay (discussed later). Online tables in Appendix 2 and 3 provide a detailed explanation of data elements used in each state along with the techniques used to estimate missing values.

We incorporated one additional major adjustment to improve the alignment of gross revenues with deductions from gross revenue. In the state financial data, gross charges were assigned in their entirety to the primary payer, while deductions from revenue were assigned to the appropriate primary and secondary payer from which the hospital received the funds. Left unadjusted, the deductions from revenue would exceed the gross charges for small payers such as self-pay. We adjusted gross revenues for each discharge using the distribution of primary and secondary payments for each primary payer developed from the Medical Expenditure Panel Survey (MEPS) (see online Appendix Table 1). For example, for hospitals with discharges showing Medicare as the primary payer in 2006, we assigned 92.7 percent of their charges to Medicare, 0.9 percent to Medicaid, 5.3 percent to private and other insurance, and 1.2 percent to self-pay. These secondary payers represent deductibles and copayments for Medicare stays that are paid by other insurers or out-of-pocket. Although most of the reassigned charges were relatively small

shares of the primary payer charges, the reassignment increased the amount of gross charges for self-pay and had a large impact on the self-pay PCRs.

The final step was to calculate net revenues (“price”) for each hospital and each payer by taking gross revenues, subtracting deductions, and adding any additions to gross revenues in each state that did not directly report net revenue. Net revenues by payer were then divided by gross revenues (charges) for each payer to create a PCR by payer for each hospital.

As shown in Table 2, PCRs created for Medicare, Medicaid, and private and other insurance produced negative values in 31 (2.5 percent) of the 1,218

Table 2: Hospitals with Negative Price-to-Charge Ratios by State, 2006

Hospitals with Negative Price-to-Charge Ratios (PCRs)							Hospitals with One or More Negative PCR by Payer	
State	Number of Hospitals in State	All Payers	Medicare	Medicaid	Private + Other Insurance	Self-Pay	Among Any Payers	Among Payers Excluding Self-Pay
Number of hospitals								
10 states	987	1	12	11	6	101	122	26
sum								
CA	350		5	1	4	5	13	9
FL	193			5		38	42	5
MA	68					3	3	0
NJ	80		5	2	1	9	14	7
NV	31	1	1		1	11	13	2
VA	80					11	11	0
WI	130		1	2		9	11	3
WV	55			1		15	16	1
State A	*						*	*
State B	*			*	*	*	*	*
Percent of hospitals								
10 states	100.0%	0.1%	1.2%	1.1%	0.6%	10.2%	12.4%	2.6%
CA	100.0%		1.4%	0.3%	1.1%	1.4%	3.7%	2.6%
FL	100.0%			2.6%		19.7%	21.8%	2.6%
MA	100.0%					4.4%	4.4%	0.0%
NJ	100.0%		6.3%	2.5%	1.3%	11.3%	17.5%	8.8%
NV	100.0%	3.2%	3.2%		3.2%	35.5%	41.9%	6.5%
VA	100.0%					13.8%	13.8%	0.0%
WI	100.0%		0.8%	1.5%		6.9%	8.5%	2.3%
WV	100.0%			1.8%		27.3%	29.1%	1.8%
State A	100.0%						0.0%	0.0%
State B	100.0%			1.5%	1.0%	3.5%	5.5%	2.0%

Note. *Counts not revealed to avoid disclosure of unidentified states.

hospitals in the study. In most cases, the negative PCRs resulted from reported contractual adjustments that were larger than the reported gross revenues. In some cases, negative PCRs occurred when payer-specific gross revenues were very small, indicating only a few stays for that hospital; quite likely, that hospital was not an approved provider for that payer and the payer paid none of the charges. In such cases, negative PCRs were created when additional deductions from revenues were estimated for that payer. Negative PCRs could also legitimately result from the inclusion of prior year or other adjustments that were unusually high for a single year, or from estimating bias or misreporting of values to the state. We excluded facilities with negative PCRs for Medicare, Medicaid, and private and other insurance.

Negative PCRs for self-pay was a larger problem affecting 8.9 percent of the hospitals in the study. Self-pay gross revenues amounted to only 6.5 percent of all inpatient hospital revenues. About three-quarters of bad debt and almost all (96 percent) of charity care were assigned as self-pay deductions (Table 1). Because the overall self-pay gross revenues were so small and the actual and estimated deductions from revenues were so large, many of the self-pay PCRs were negative, leading us to conclude that we could not estimate self-pay deductions from revenue with enough accuracy to make them reliable.

Calculating Prices. Once the payer-specific PCRs were created, we identified the primary payer for each HCUP-SID discharge and applied the PCR for that payer and hospital to the charges recorded on the HCUP-SID. This created an estimated payer-specific “price” for each discharge in HCUP-SID.

Limitations. A major assumption in estimating HCUP prices is that hospital-specific charges are discounted for specific payers to the same extent regardless of diagnosis or procedures performed. Various studies suggest that charge markups can vary substantially by service (Dobson et al. 2005; Dalton 2007). This suggests some variation in the payer-specific prices received compared to the charge for specific services within the same hospital. Our methods also assume that all payers within a payer group are discounted to the same extent. A study by Ginsburg (2010) notes that payments to hospitals by private insurers are usually based on one of three methods: markups of Medicare diagnosis-related group (DRG) rates, per-diem rates (usually preferred by managed care insurers), or negotiated discounts from charges. Most of the data reported

for this study combines managed care payments for Medicare, Medicaid, and private insurance with the fee-for-service counterparts for those payers. Both Medicare fee-for-service payments with its nationwide payment methodology and Medicaid fee-for-service with their state specific payment methodologies will set, rather than negotiate prices with hospitals. However, managed care plans under both programs as well as under private insurance can negotiate prices with hospitals. To the extent that prices for managed care plans are set by methods different from those of fee-for-service or other payers within the same payer group, the resulting price-to-charge ratios can be distorted for any particular discharge.

Validating PCRs and Prices

Comparison of PCRs and CCRs. To determine the validity of the PCRs, we compared them with HCUP's cost-to-charge ratios (CCRs) developed from hospital-specific Medicare Cost Reports (Table 3).⁶ The results show strong correlations between the CCR and PCRs for the 10 states combined and for

Table 3: Correlation of Price-to-Charge Ratios (PCR) and Cost-to-Charge Ratios (CCR), 2006

<i>State</i>	<i>Number of Hospitals with Actual CCRs</i>	<i>Number of Hospitals with and without Actual CCRs</i>	<i>Percent of Hospitals with Missing CCRs</i>	<i>Correlation Coefficient for Hospital All-Payer PCR and CCR*</i>	<i>p-Value*</i>
All hospitals	937	1,144	18%	0.892	<.0001
CA	267	312	14%	0.889	<.0001
FL	150	187	20%	0.812	<.0001
MA	57	67	15%	0.657	<.0001
NJ	40	66	39%	0.368 [‡]	0.0194
NV	21	29	28%	0.834	<.0001
VA	77	80	4%	0.865	<.0001
WI	103	127	19%	0.792	<.0001
WV	27	53	49%	0.875	<.0001
State A	†	†	0%	0.808	<.0001
State B	†	†	14%	0.849	<.0001

Note: CCR is cost-to-charge ratio calculated by the Agency for Health Research and Quality for the Healthcare Cost and Utilization Project from data submitted on Medicare Cost reports. PCR is price-to-charge ratio.

*Correlations include only hospitals with actual, rather than cohort average, CCRs.

†Counts not revealed to avoid disclosure of unidentified states.

‡Low correlation coefficient caused by one hospital where CCR is substantially different from other CCRs in the state. Removal of this hospital from calculation boosts the correlation coefficient to 0.781.

most individual states. The low correlation for New Jersey (0.3681) is because of one hospital; removal of that facility where the CCR appears to be an outlier boosts the correlation to 0.7813. These strong correlations suggest that the data from two different data collection mechanisms show substantially similar results for these closely related ratios.

Comparison of Prices to Other Sources. Validating inpatient hospital prices is difficult because few sources of payer information comprehensively cover all discharges to the extent captured in the state financial data and HCUP. For example, claims databases often do not capture managed care costs for individual hospital discharges and sample surveys may exclude portions of the population and are subject to sampling variability. In Table 4, we display price

Table 4: Comparison of Prices for Hospital Stays by Payer among Various Datasets, 2006

<i>Data Source</i>	<i>All Payers</i>	<i>Medicare</i>	<i>Medicaid</i>	<i>Private and Other Insurance</i>	<i>Self-Pay*</i>
HCUP–10 states [†]	\$8,827	\$8,418	\$7,128	\$10,290	\$7,813
MEPS–all states [‡]	\$8,888	\$9,584	\$6,751	\$9,493	\$5,374
MarketScan–all states [§]				\$10,101	
Medicare–10 states ^{*,¶}		\$9,850			
Medicare–all states [¶]		\$8,691			

Note. *Self-pay is a relatively small payer category, accounting for only 4% of all hospital revenue.

[†]Ten states refer to California, Florida, Massachusetts, New Jersey, Nevada, Virginia, West Virginia, Wisconsin, and two states where permission to identify them was not obtained. HCUP estimated prices for self-pay are less reliable than estimates for other payers because of its small size and the amount of estimation that is required in many states.

[‡]MEPS is a household survey that collects health care event information from a sample of 12,811 households that included 32,577 individuals in 2006. There were 3,202 inpatient hospitalizations in 2006 included in the survey. High cost and Medicaid stays tend to be undercounted and subsidies for uninsured care, including Medicaid Disproportionate Share payments, are not included.

[§]The Truven Health Analytics MarketScan commercial claims database is comprised of claims from a convenience sample of self-insured employer plans with generous benefit coverage as well as some health insurance plans. Stays were counted only if the insurance payment was greater than or equal to 50% of revenue the hospital was expected to receive for the stay, indicating that private insurance was the primary payer. Other payers are not included in the MarketScan data.

[¶]Derived from a sample of Medicare fee-for-service claims. Available at <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MedicareMedicaidStat-Supp/2007.html>, Table 5.4. Excludes managed care payments and final payment settlements that take place after initial reimbursement is made to the hospital.

Sources: Hospital financial data from 10 states; Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Survey, State Inpatient Databases for 10 states; Medical Expenditure Panel Survey; Truven Health Analytics MarketScan database; and Centers for Medicare and Medicaid Services Medicare payment tables.

information from the most credible data sources. These sources included MEPS, sponsored by AHRQ that surveys households for their medical expenditures; Truven Health Analytics MarketScan commercial claims database; and Medicare standard analytic claims files from the Centers for Medicare and Medicaid Services (CMS). For each data source, we calculated nationwide average inpatient hospital prices and for Medicare we also calculated average inpatient prices for the 10 states used in this study. For both HCUP and MEPS, managed care payments are included with their respective Medicare, Medicaid, and private and other insurance payments.

HCUP. Table 4 shows the prices calculated using PCRs and HCUP charges. The overall average price of a hospital stay in 2006 was \$8,827 across 10 states. The average prices paid by private and other insurance (\$10,290) were higher than the all-payer average; those paid by Medicare (\$8,418), Medicaid (\$7,128), and self-pay (including the uninsured, \$7,813) were lower than the all-payer average. Self-pay average prices were higher than one might expect because of the inclusion of government subsidies, indigent care pools, and charity care funding to offset revenues not collected from patients or insurers.

Medical Expenditure Panel Survey. Medical Expenditure Panel Survey is a household survey that collects health care event information from a sample of 32,577 individuals in 2006; people residing in institutions are excluded. The average payments reported by MEPS are generally similar to HCUP prices, but this difference varied by payer. The all-payer average payment reported by MEPS (\$8,888) is very similar to our study results (\$8,827). By payer, MEPS Medicare average payment is 14 percent higher and Medicaid average payment is 5 percent lower than our study results. MEPS private and other insurance average payments are 8 percent lower than our study results, while the MEPS average price for self-pay is 31 percent lower than those estimated in the study.

Medical Expenditure Panel Survey prices will differ from HCUP prices for specific payers for several reasons. First, because MEPS is a survey with only 3,202 inpatient stays in 2006, each estimate will have a substantial sampling variance, especially by payer. Next, because MEPS is a household survey, its accuracy depends on the respondent's ability to identify all medical events. Missed events occur, although less frequently for hospital inpatient stays than for other types of events. In addition, MEPS excludes certain

groups of people from its sample, including nursing home residents and active-duty military, and experiences underreporting of certain high-cost cases and Medicaid and uninsured stays (Selden and Sing 2008). For the institutionalized population, the average price of a hospitalization for these patients is lower than for patients residing in the community (Spector et al. 2012), possibly because of a less intensive case mix. Furthermore, MEPS does not collect information on certain revenue sources associated with Medicaid and Medicare, including Medicaid DSH payments made to certain hospitals serving a large percentage of Medicaid and uninsured patients, Medicare DSH, and other revenue adjustments that take place outside of claims transactions such as state and local government hospital subsidies, charity funds, and indigent care pools. These factors produce a shortfall in hospital revenue counted in MEPS compared to our HCUP prices.

MarketScan. The Truven Health Analytics MarketScan commercial claims database comprises data from approximately 30 million covered lives each year. We counted MarketScan claims if the amount paid by the private insurance plan was expected to be greater than or equal to 50 percent of the total payment to a hospital, indicating that private insurance was the primary payer. MarketScan private insurance average price for an inpatient hospitalization was \$10,100, almost identical to the HCUP average price of \$10,290.

Medicare. Medicare fee-for-service (FFS) claims come from a sample of claims that exclude managed care claims and final payment settlements. The Medicare FFS average reimbursement in 10 states (\$9,643) was higher by 15 percent than our HCUP-estimated Medicare prices (\$8,418). At least part of the difference is related to managed care claims excluded from the CMS source but included in the HCUP-estimated prices. By subtracting the CMS Medicare FFS discharges and charges from the HCUP Medicare discharges and charges that include managed care, we can estimate that the average charge per Medicare managed care discharge is 15 percent lower than the average charge for FFS Medicare stays.

Medicare is the only payer where we could accurately assess the average prices of our 10 HCUP states against all states. This information shows that average Medicare prices in our 10 states (\$9,643) were 10 percent higher than the all-state Medicare average price (\$8,691) from the same database.

Table 5: Average Price by State for Inpatient Hospitalizations Adjusted for Case Mix and Geographic Wage Differences

<i>State</i>	<i>Average Prices for Inpatient Hospitalizations</i>			
	<i>All Payers*</i>	<i>Medicare</i>	<i>Medicaid</i>	<i>Private and Other Insurance</i>
<i>Unadjusted prices in dollars</i>				
10 states [†]	8,828	8,418	7,129	10,290
California	9,437	8,187	7,058	11,489
Florida	7,528	6,518	5,393	11,073
Massachusetts	9,628	9,268	7,730	10,747
Nevada	7,000	6,086	6,299	8,765
New Jersey	8,224	7,462	7,326	9,005
Virginia	7,504	6,738	5,335	9,192
West Virginia	6,898	6,616	5,217	9,106
Wisconsin	9,137	8,113	4,153	12,040
State A	9,297	12,398	5,028	8,580
State B	9,928	11,224	9,370	9,016
<i>Prices adjusted for case mix and geographic area wage differences</i>				
10 states	8,723	8,482	6,844	10,157
California	8,227	7,366	6,218	9,841
Florida	8,144	7,279	5,744	11,754
Massachusetts	9,534	9,500	7,793	10,330
Nevada	6,141	5,960	5,331	7,512
New Jersey	8,394	7,206	6,968	9,751
Virginia	8,635	7,772	5,959	10,642
West Virginia	8,826	8,898	5,976	11,471
Wisconsin	9,699	8,560	4,566	12,801
State A	8,403	10,867	4,393	8,161
State B	9,842	11,113	9,131	8,930

Note. Prices were adjusted for case mix using diagnosis-related group (DRG) weights reweighted to 1.000 for each payer and for geographic wage differences using the Medicare wage index reweighted to 1.000 for all payers. If the DRG weights were missing because the DRG was not valid in 2006 or if the wage index was missing, the associated discharges were dropped from this table. Differences in the 10 state totals were due mostly to Medicare wage indices that were reweighted to 1.000 for the all-payer total only.

*Includes self-pay prices not shown separately.

[†]Total differ slightly from those reported in Table 2 because discharges with missing DRG weights or missing Medicare wage indices were dropped from this table.

RESULTS

Estimated Inpatient Hospitalization Prices

In Table 5, average prices by state are presented as both unadjusted and adjusted for case mix and differences in area wage rates. We used the Medicare wage index rescaled to 1.000 for all-payer totals in the 10

states to adjust for geographic variation in prices and DRG weights rescaled to 1.000 for our 10 states by payer to adjust for differences in case mix among states. Because the DRG weights are rescaled by payer, the prices presented are comparable among states within a specific payer, rather than being comparable across payers within the same state.

Unadjusted prices averaged \$8,828 across the 10 states and ranged from \$6,898 in West Virginia to \$9,928 in State B—a 44 percent difference. Once adjusted for case mix and geographic differences in wage rates, the range in prices narrows, as expected, for Medicare that pays more uniformly across areas. The range in prices also narrows for Medicaid but remains wide among the 10 states for private and other insurance.

Average payments by payer can be affected by a number of other factors, including the percent of discharges enrolled in managed care plans that can independently negotiate prices for Medicare and Medicaid. In areas with intense competition among hospitals, insurers have the advantage of negotiating lower prices than they could in areas where a hospital is a sole community provider. Outpatient department prices can also influence pricing for inpatient services to the extent that proportionately higher prices when compared to costs may be obtained for outpatient services. Over the long run, hospitals need to set prices across all departments to cover their costs plus a small margin.

DISCUSSION

Motivation for creating PCRs was to enhance the usefulness of HCUP administrative inpatient databases in policy investigations and to make hospital prices more transparent to consumers. Currently, the only financial measure included in HCUP is charges. For 2001 and later years, AHRQ created hospital-wide CCRs using Medicare Cost Reports available for most acute care hospitals. However, costs do not translate directly into payer-specific payments because of differences in charge discounting among payers. This project goes beyond what CCRs can do to develop adjustment factors for charges that are specific to payers.

For consumers with and without insurance, publicly available prices provide important information that will allow for more informed choices on where to seek treatment. When paired with quality measures, prices

allow consumers to understand trade-offs between price and quality. In addition, publicly available insurance prices would provide self-pay patients with information to negotiate their own discounts for treatment in hospitals.

Researchers have been trying to identify and quantify the factors associated with differences in spending since Wennberg and Gittelsohn (1982) first published information about the differences in Medicare spending by geographic area. Despite decades of research, much of the variation remains unexplained (Zuckerman et al. 2010). Kronick and Gilmer (2012) suggest the need to broaden analyses beyond Medicare because decisions made about setting Medicare payment rates can have unintended consequences for other payers who negotiate their prices. HCUP estimated prices could further the investigation of the interplay of payer pricing within hospitals. HCUP is unique in its capture of all acute hospital discharges in most states and may be a useful resource for this type of analysis.

Our study has estimated paid prices that vary considerably between states and can be used to estimate variations in prices within states for specific conditions. The potential causes of differences are many, including variation in practice patterns, health care resources (including the supply of hospital beds and technology), and hospital ownership and other facility characteristics. The degree of local area competition can either constrain prices in very competitive areas or allow more rapid proliferation of cost growth in areas with little competition (Robinson 2011). Patient characteristics, including population insurance status, can influence hospital price setting. State Medicaid payment policies along with state and local government capacity for funding uncompensated care can affect the extent of cost-shifting to private payers (Ginsburg 2003; Zwanziger and Bamezai 2006).

Under the Affordable Care Act (ACA), an additional 34 million persons are expected to be insured through Medicaid or health insurance exchanges by 2019 (Foster 2010). This coverage should reduce the need to shift hospital costs from the uninsured to the insured population. ACA will reduce the need for subsidization of inpatient hospital treatment made through Medicaid DSH and state uncompensated care funds. These changes will likely impact pricing differentials among payer prices for hospitalization as the number of uninsured drops and as insurance coverage picks up a higher share of the costs for inpatient treatment. Changes to hospital prices can be tracked using this estimating method to document the

consequences as hospital pricing is transformed under ACA—at least in 10 states.

CONCLUSION

This study demonstrated a method that could be used to reasonably estimate inpatient hospital prices for most of the major insurers by merging datasets collected by states for different purposes. Estimated prices could be used to study pricing policies for particular services, and how those policies vary based on hospital characteristics, case mix, and competition within the local market. Hospital inpatient prices also fill an important gap in information that could increase the transparency of the health care system to consumers who are asked to pay substantially higher prices than insurers. Understanding factors influencing prices historically as hospitals begin to adapt to forthcoming changes from the ACA would allow policy makers to react knowledgeably to expected and unexpected effects of the ACA on the hospital system.

ACKNOWLEDGMENTS

Joint Acknowledgment/Disclosure Statement: The authors would like to acknowledge the data organizations that contributed data to HCUP that were used in this study: California Office of Statewide Health Planning and Development; Florida Agency for Health Care Administration; Massachusetts Division of Health Care Finance and Policy; Nevada Department of Health and Human Services; New Jersey Department of Health and Senior Services; Virginia Health Information; Washington State Department of Health; West Virginia Health Care Authority; and Wisconsin Department of Health Services. We also acknowledge the work of the Truven Health Analytics staff: Jayne Johann for obtaining the state financial information from states; Yu Sun for computer programming; and Linda Lee for editorial review. This study was supported by the Agency for Healthcare Research and Quality. The views expressed herein are those of the authors. No official endorsement by the U.S. Department of Health and Human Services, the Agency for Healthcare Research and Quality, or the data organizations that provided data used in this study is intended or should be inferred.

Disclosures: None.

Disclaimers: None.

NOTES

1. Data from the National Health Expenditure Accounts is available at <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/Proj2011PDF.pdf>.
2. All fee-for-service Medicare claims are available from the Centers for Medicare and Medicaid Services. For more information, see <http://www.cms.gov/IdentifiableDataFiles/>. The Healthcare Cost and Utilization Project, in partnership with state data organizations, collects administrative charges and other information for discharges from community hospitals. See <http://www.hcup-us.ahrq.gov/> for additional information.
3. For additional information, go to <http://www.hcup-us.ahrq.gov/>. The database retrieval tool can be accessed at <http://hcupnet.ahrq.gov/>.
4. HCUP data contains discharges. States varied as to whether they collected discharges or admissions with their state financial data. Admissions do not include newborns; discharges usually do include newborns when discharged separately from the maternal stay.
5. HCUP-SID consistently reports on a 12-month calendar year basis while the state financial data may be the state fiscal year or other 12-month period.
6. For more information, go to <http://www.hcup-us.ahrq.gov/db/state/costtocharge.jsp>.

REFERENCES

- Dalton, K. 2007. "A Study of Charge Compression in Calculating DRG Relative Weights." CMS Contract No. 500-00-0024-TO18. Baltimore, MD: Centers for Medicare and Medicaid Services [accessed on November 11, 2010]. Available at <https://www.cms.gov/reports/downloads/dalton.pdf>
- Dobson, A., J. DaVanzo, J. Doherty, and M. Tanamor. 2005. *A Study of Hospital Charge Setting Practices*. No. 05-4. Washington, DC: MedPAC [accessed on November 11, 2010]. Available at http://www.medpac.gov/documents/Dec05_Charge_setting.pdf
- Foster, R. S. 2010. Estimated Financial Effects of the "Patient Protection and Affordable Care Act" [accessed on February 21, 2011]. Available at https://www.cms.gov/ActuarialStudies/Downloads/PPACA_2010-04-22.pdf
- Ginsburg, P. 2003. "Can Hospitals and Physicians Shift the Effects of Cuts in Medicare Reimbursement to Private Payers?" *Health Affairs* [accessed on February 21, 2011]. Available at: <http://content.healthaffairs.org/content/early/2003/10/08/hlthaff.w3.472.full.pdf>.
- Ginsburg, P. 2010. "Wide Variation in Hospital and Physician Payment Rates Evidence of Provider Market Power." Research Brief No. 16, 2010. Washington, DC: Center for Studying Health System Change [accessed on November 11, 2010]. Available at <http://www.hschange.com/CONTENT/1162/>

- Kronick, R., and T. P. Gilmer. 2012. "Medicare and Medicaid Spending Variations Are Strongly Linked within Hospital Regions but Not at Overall State Level." *Health Affairs* 31 (5): 948–55.
- Robinson, J. 2011. "Hospitals Respond to Medicare Payment Shortfalls by Both Shifting Costs and Cutting Them, Based on Market Concentration." *Health Affairs* 30 (7): 1265–71.
- Robinson, J. C., and K. MacPherson. 2012. "Payers Test Reference Pricing and Centers of Excellence to Steer Patients to Low-Price and High-Quality Providers." *Health Affairs* 31 (9): 2028–36.
- Selden, T. M., and M. Sing. 2008. *Aligning the Medical Expenditure Panel Survey to Aggregate U.S. Benchmarks*. Working Paper No. 08006. Rockville, MD: Agency for Healthcare Research and Quality [accessed on November 11, 2010]. Available at http://www.meps.ahrq.gov/mepsweb/data_files/publications/workingpapers/wp_08006.pdf
- Sommers, R., S. D. Goold, E. A. McGlynn, S. D. Pearson, and M. Danis. 2013. "Focus Groups Highlight That Many Patients Object to Clinicians' Focusing on Costs." *Health Affairs* 32 (2): 338–46.
- Spector, W., R. Mutter, P. Owens, and R. Limcangco. 2012. "Transitions between Nursing Homes and Hospitals in the Elderly Population, 2009." HCUP Statistical Brief #141. Rockville, MD: Agency for Healthcare Research and Quality [accessed on September 28, 2012]. Available at <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb141.pdf>
- Wennberg, J., and A. Gittelsohn. 1982. "Variations in Medical Care among Small Areas." *Scientific American* 246 (4): 120–34.
- Zuckerman, S., T. Waldmann, R. Berenson, and J. Hadley. 2010. "Clarifying Sources of Geographic Differences in Medicare Spending." *New England Journal of Medicine* 363: 54–62.
- Zwanziger, J., and A. Bamezai. 2006. "Evidence of Cost Shifting in California Hospitals." *Health Affairs* 25 (1): 197–203.

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

- Appendix SA1: Distribution of Inpatient Hospital Stay Payments from Primary Payers to Primary and Secondary Payers, 2006.
- Appendix SA2: How to Use This File.
- Appendix SA3: Author Matrix.